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DDT FOR PECAN WEEVIL CONTROL IN THE SOUTHEASTERN STATES

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In the Piedmont areas of the Southeastern States the pecan weevil (Curculio caryae (Horn)) (fig. 1) causes serious losses in many orchards. The pest is also gradually becoming abundant and causing serious losses in pecan orchards in an increasing number of localities in the Coastal Plains areas of these States.

Pecan varieties differ widely in their susceptibility to attack. The early maturing varieties, such as the Schley, Stuart, Mahan, and MoneyMaker, are the most subject to infestation, because the weevils seek nuts with early developing kernels in which to lay their eggs. The late maturing varieties, such as the Success, Mobile, and Van Deman, are not usually attacked, unless the crop on the early maturing varieties is very light or has been destroyed early in the fall.

Pecan weevil damage is of two types—(1) that resulting from attack before the shell-hardening period in July and August and causing all affected nuts to drop, and (2) that resulting from attack after kernel formation and usually causing the shuck of infested nuts to stick tight to the shell instead of opening normally. Weevil-injured nuts of the second type contain grubs (fig. 2) which destroy the kernels, or they contain holes about one-eighth inch in diameter (fig. 3) which mature grubs have bored and through which they escaped after destroying the kernels. The first type of damage often passes unnoticed and is due to the feeding of early emerging weevils, which puncture the immature nuts with their long lancelike beaks to feed on the juices within. Since all nuts punctured in this way before the shell-hardening period drop to the ground, the entire crop may be lost if weevils are abundant and the crop is light. Such damage may be heavy even when a large crop is attacked. The second type of damage is generally noticeable at harvesttime in October and November, and in seasons when large numbers of weevils have been present practically the entire crop may be wormy at harvest.

Since the weevils do not feed very much on the outer surface of developing pecan nuts, stomach poisons applied to trees have been of little practical value in control. In 1944, however, laboratory tests showed that DDT could kill the adults, and that it was worthy of field trial.

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Preliminary orchard tests with DDT were carried out in 1945 at Fort Valley, Ga., on trees known to be severely infested according to records maintained since 1942. All the trees were sprayed four times during the season with bordeaux mixture to control pecan scab. The first application of DDT against the weevil was combined with the last application of bordeaux mixture on July 23. Seven Schley pecan trees were used for each of three plats, two sprayed and one unsprayed. The details of the treatments and the results obtained are given in table 1.

Table 1.--Field tests with DDT for control of the pecan weevil, 1945.

DDT in	: Dosage per :		Dates of	Nuts harvested		
wetttable	: 100 gallons :			Total	Infested	Marketable
powder	: Powder :	DDT :	yield per			
	:	:		tree		
Percent	Pounds	Pounds	Number		Percent	Pounds
50	8.0	4.0	July 23,	41,817	1	86
			Aug. 6 and 21			
40	4.5	1.8	July 23	25,286	14	39
Check	None	-	-	23,018	21	33

The results of these tests showed that a high degree of control of the pecan weevil could be obtained with three applications of a spray containing 8 pounds of a 50-percent DDT wetttable powder in 100 gallons of water and that such control would be reflected in increased yields of good nuts at harvesttime. It was also apparent that more than one application of DDT would probably be necessary. The evidence was not clear on this point, however, since the single-application treatment was made at a reduced strength of DDT and heavy rains may have removed some of the insecticide.

In 1946 additional field tests were made with DDT on Schley trees that had been severely infested with weevils in previous years. All treatments were replicated four times and each plot received four bordeaux sprays for pecan scab control. The last bordeaux application was delayed until July 30, when it was combined with the first of the two DDT applications given each plot. This application was made before there was much weevil emergence, to prevent, if possible, the losses that result from the feeding punctures made by the pecan weevil between the time of emergence and egg laying. The second application of DDT was made on August 9. In two of the treatments a latex material known as polyethylene polysulfide was included as a sticker. A total of 26,077 nuts were examined in determining the results of the tests, which are summarized in table 2.

Table 2.—Field tests with DDT for control of the pecan weevil, 1946

Treat- ment No.	: Material per : 100 gallons		: Weevil- : infested:		: Yield per tree : : Non- : Market-:		: Approxi- : Value of : mate cost: market- : of DDT : able nuts	
	: 50% DDT : Poly- : wettable: ethylene: : powder : poly- : : sulfide :	: nuts at : harvest :	: infested: : nuts :	: able : nuts :	: able : nuts :	: per tree : per tree :	: per tree : per tree :	: per tree : per tree :
	<u>Pounds</u>	<u>Pounds</u>	<u>Percent</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Dollars</u>	<u>Dollars</u>	
1	2	0	9	10	7	.60	3.15	
2	4	0	5	11	8	1.20	3.60	
3	4	2	3	12	10	1.20	4.50	
4	6	2	1	26	23	1.80	10.35	
5(Check) -	-	0	43	4	1/4	-	.11	

Even though it was a poor crop year and severe weevil infestations were expected, all the DDT treatments in the 1946 tests significantly reduced the percentages of weevil-infested nuts at harvesttime. The best results were obtained with 6 pounds of a 50-percent DDT wettable powder with 2 pounds of polyethylene polysulfide to 100 gallons of spray. The differences in the average yields of noninfested nuts and marketable nuts, and in the value of the marketable nuts between treatments Nos. 1, 2, and 3, were not significant. As there were indications that the DDT applications were effective against other insects that often limit nut production, the differences in nut yields may not have been due entirely to the effect of the treatments on the pecan weevil. The results of treatments Nos. 2 and 3 indicate that the polyethylene polysulfide that was used as a sticker did not appreciably increase the effectiveness of the DDT.

From the results obtained in 1945 and 1946 it appears that at least two applications of DDT will be necessary for the effective control of the pecan weevil; however, the possibilities of one application have not been fully investigated.

The results of the tests in 1946 show that in a poor crop year the pecan weevil may destroy practically all the crop. In the untreated plots 43 percent of the nuts were infested with weevils at harvesttime. The yield of noninfested nuts in these plots was only 4 pounds per tree, of which 1/4 pound was marketable.

The effectiveness of two applications of DDT at the rate of 6 pounds of a 50-percent wettable powder to 100 gallons of water in reducing harvest infestations to 1 percent gives rise to the hope that this treatment, applied for several seasons, will eliminate a pecan weevil infestation in an orchard, or will reduce it to such an extent that spraying every year will not be necessary.

DDT is the most effective poison yet found for the protection of pecans from weevil attack, but there remains much to be learned before a final recommendation can be made. However, for the benefit of those pecan growers who wish to try this material, the following tentative recommendation is made based on the time of weevil emergence: Make two applications of DDT at the rate of 6 pounds of a 50-percent wettable powder to 100 gallons of spray, the first during the last week in July and the second 10 days later in Georgia, Alabama, and Mississippi. In South and North Carolina the first application should be made during the first and second week in August, respectively, and the second 10 days later. When bordeaux mixture is being used for pecan scab control, the last seasonal application of this fungicide can be delayed and combined with DDT in the first application of DDT for weevil control, since the two materials can be used together.

The time of the first application of DDT cannot be based on the time of the first drop of nuts, because other pecan insects also cause the nuts to drop during July and August. However, pecan growers who wish to make the effort can time the first application accurately by spreading a sheet on the ground beneath an infested tree and lightly jarring the branches to dislodge the weevils. When the weevils are disturbed they fall and "play possum" and can be easily collected. When a minimum of six weevils can be taken by jarring the branches on any one tree, it is time to make the first application.

In handling DDT one should use the same care as with other known insecticides, such as lead arsenate, calcium arsenate, and nicotine.



Figure 1.--Pecan weevils on Schley pecans.

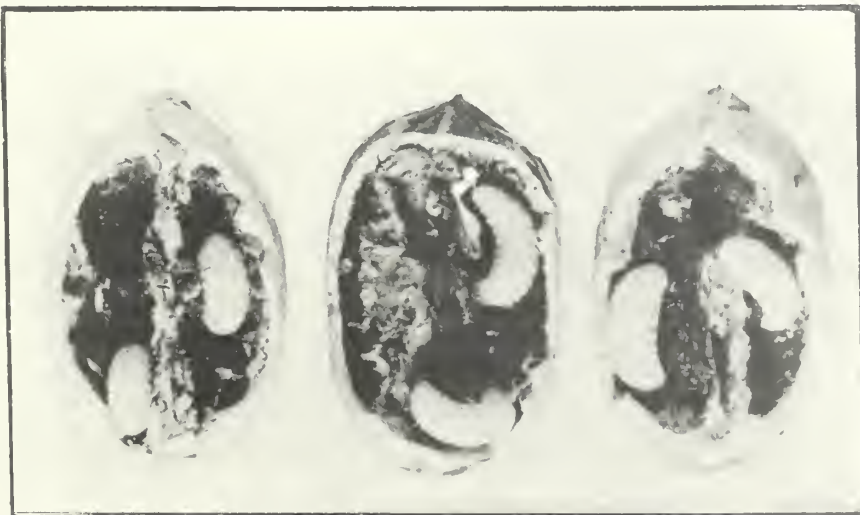


Figure 2.--Grubs of the pecan weevil in Stuart pecans.



Figure 3.—Grubs of the pecan weevil emerging through holes in pecan nuts.